Can / Am EMTP News

Voice of the Canadian/American EMTP User Group

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Salford EMTP Use Costs Nothing!

No longer is there a $50 licensing fee (plus $5 handling) associated with each 80386-based computer that supports the Salford EMTP. This is the big news from Europe during October of 1990. LEC purchased the rights to distribute DBOS/386 without limit along with the Salford EMTP from Salford's agent (And Computer) in Rotterdam, Holland. License number 582, purchased by LEC, has two advantages for EMTP users on this side of the Atlantic. First, there are no geographical limits on the distribution (i.e., LEC can distribute DBOS in the USA and Canada). Second, there is no paper work required of the end user (remember the previous licensing of user and computer by OTG Systems). Needless to say, this represents enormous progress that should accelerate the already rapid movement to the Salford EMTP within the USA and Canada. To conclude, interested users no longer have any need to send money or paper work to OTG Systems in Clifford, Pennsylvania. Salford EMTP distribution now involves a 3rd computer disk which contains the Salford software. When DBOS is executed, "LEUVEN EMTP CENTER" and license number 582 will be seen on the screen. The Can/Am EMTP User Group is LEC's agent for the USA and Canada, of course.

LEC Meeting October 15-16, 1990

Dr. Meyer spent the month of October in Leuven, Belgium, working on EMTP with staff of LEC (the Leuven EMTP Center). Included was the annual meeting that was held on Monday and half of Tuesday, October 15-th and 16-th. Several observations follow.

Once again (every six months), the Can/Am user group has numerous technical papers about EMTP but no plan to make this information available to others. Those in Portland already are too preoccupied with other aspects of EMTP development to take on any such added obligation as the distribution of copies to others. But what about others, using the secondary printing and distribution of *EMTP News* as a model? Of course, the best decision regarding distribution would depend on the number of recipients. For some small number (e.g., 10) of persons, one copy might simply be mailed from one member to another. That way, each recipient could decide what, if anything, he would photocopy and retain for his own records. Still, ignoring the problem of a weak link in the chain, such distribution would require time for organization and tracking. Should interested readers have ideas or opinions on the subject, they are invited to contact ATP developers in Portland. A list of printed matter obtained at the meeting follows, for those who might be interested but have no idea what is involved :

*) 2-page attendance list documenting names, firms, nationalities, and telephone numbers.

*) 19-page paper entitled "Use of statistical and systematic switches."

*) 5-page paper entitled "ATP as seen from an industrial user."

*) 10-page paper entitled "Computation of line side oscillation under short line fault in the hv networks."

*) 28-page paper entitled "Adapting the EMTP for classroom instruction. Part II : power electronics."

*) 18-page paper entitled "Adapting the EMTP for classroom instruction. Part III : Transient analysis of linear systems."

*) 8-page paper entitled "RLC representation of a frequency dependent admittance."

*) 4-page paper entitled "Restructuring of TPPLOT."

*) 5-page paper entitled "Introduction to VAX GKS."

*) Pages 3-22 of September issue of *EMTP News*.

*) 13-page paper entitled "Teaching power electronics converters control circuits using ATP."

*) 7-page paper entitled "Switching off 750 kV shunt reactors."

*) 11 LEC pages entitled "Miscellaneous: performed activities; trend analysis; budget; discussion points."

*) 6 pages documenting Dr. Meyer's address. Of his five addresses to LEC, this is the first to be documented carefully in print.

Regarding Can/Am policy that protects ATP from commercial exploitation, there was one decision, one non-decision, and one oversight. First, Prof. Ned Mohan of the University of Minnesota was authorized to proceed with his proposed new EMTP short course that would omit all licensing of students (see a separate story for details). Second, there was a refusal to consider Dr. Meyer's request that LEC think about selling ATP to those who are involved in EMTP commerce. Today, ATP simply is denied to such individuals and/or organizations. Dr. Meyer's idea was to soften the blanket prohibition, replacing it by a policy of reciprocity. If some person's EMTP development has not been shared freely with LEC, and if instead it is being sold for $48K/year (the most recent documented price of which the user group has written confirmation) by EPRI, why not allow the developer (e.g., Prof. Dommel in Vancouver, B.C.) access to ATP for the same price? Unfortunately, LEC Chairman Van Dommelen refused to have the audience discuss this point. A third idea was that of possible ATP pardons for an important DCG member such as IREQ / Hydro-Quebec in Montreal or an important DCG/EPRI contractor such as General Electric (G.E.) in Schenectady, New York. Dr. Meyer explained that he personally would recommend an ATP pardon for any such important organization that ceased its past or current EMTP commerce and promised no such activity in the future. Yet, he emphasized that this was only the opinion from North America, that LEC would have the final word (a subsequent opportunity to disapprove any such possible negotiated ATP pardon). Unfortunately, there was no opinion or discussion at all from either the LEC Chairman or the audience on this important final point. This is more than just an academic issue since both IREQ / Hydro-Quebec and G.E. in Schenectady have indicated that they would like to use ATP. But present rules prevent any such licensing.

LEC did have an 80386-based computer available for the demonstration of Salford EMTP and TPPLOT, but unfortunately, the demonstration by Dr. Meyer was not very good. First, the computer was not available at the end of the first day as scheduled, so it was not possible for the audience to digest what it saw, and experiment with the new software, before returning home. The demonstration was postponed until mid-morning of the 2nd day, when the meeting already was running behind schedule, so it was rushed. Another problem could be blamed on the hardware: a Toshiba 5100 portable without external monitor. The display was small, monochrome, and not easily seen from an angle. Finally, a Belgian keyboard, which is not qwerty, made keying slow and error-prone for Dr. Meyer. The need for external keyboard and monitor (or VGA projector as Prof. Mohan plans to use for his portable EMTP short course next summer) was never greater.

Visit by Robert Chafer of Salford

Robert Chafer of Salford Software Marketing, Ltd., visited ATP developers in Portland on September 24th. Many, many ideas were exchanged during 7 or so hours of discussion with this expert who understands the intricacies of FTN77 / 386 (the Salford FORTRAN compiler for Intel's 80386).

The use of Salford's COMSPACE utility was the first suggestion of Mr. Chafer to pay really big dividends for Salford EMTP and Salford TPPLOT users everywhere. The OS command of either SPY or the separate interactive plotting program TPPLOT allows the user to issue operating system (MS-DOS) commands. Yet, this was limited initially because Salford default memory limitations prevented the execution of sophisticated MS-DOS commands such as CHKDSK or the running of a program. No longer is there such a concern, however. To execute the shareware utility LIST, for example, issue the MS-DOS command COMSPACE d'75000' prior to starting the Salford EMTP or TPPLOT. This reserves 75 Kbytes for MS-DOS. To run Quicksoft's shareware editor PC-Write 3.0, request 250 Kbytes.

About Intel's 80486, Mr. Chafer indicated that use of Salford's DOS extender for the 80386 (DBOS/386) might be wasting half the speed of the machine for a coprocessor-bound application. To conclude, it is not obvious that 80486-based computers should be acquired for use with EMTP until Salford's 80486-based software (compiler FTN77 / 486 and DOS extender DBOS / 486) are available as well. EMTP users at BPA have requested two such machines, but their delivery is far from guaranteed at this early date. Those with interest in 80486-based computers should monitor the BPA procurement closely since it is unlikely that the user group will purchase FTN77 / 486 the way it did FTN / 386. Someone else, or some other organization, will have to finance Salford EMTP support for the 486, and BPA is a promising candidate.

Faster Intel 80387 Coprocessors

Faster Intel 80387 math coprocessors recently have been introduced for the support of slower-speed 80386 main processors. This is according to a short news item at the bottom of page 30 of the October 1, 1990, issue of *Electronic News* magazine. This removes some of the mystery of why a 33-MHz coprocessor was more powerful than its clock rate would suggest. According to an Intel

source, "The new 387 version achieves greater speed because of a rewritten microcode and the use of a 1-micron CHMOS process." It seems that this superior hardware has been available for some time in the 33-MHz version. Not only is speed better, but there is less heat: power consumption has been reduced by 1/3.

Ned Mohan's EMTP Short Course

Prof. Ned Mohan of the University of Minnesota was authorized by those attending the 1990 LEC meeting to prepare an even shorter and simpler EMTP short course than his successful offering last summer. The proposed course required special approval because it would involve no ATP licensing (the ATP "AFFIRMATION"). No, ATP materials (the computer program and its Rule Book) will not be disclosed to those who have participated in EMTP commerce. In fact, ATP materials will not be given to any registrant as part of the course. Nor will there be any computers for the execution of ATP by students during the course. This is a radical departure from all previous ATP short courses in North America, of course. Prof. Mohan plans to project ATP execution using an overhead projector, however.

Apple Macintosh Versions of ATP

John Schwartzenberg, Jr. has reported success supporting ATP on Apple Macintosh II computers at Drexel University in Philadelphia. The interested reader is referred to pages 38-41 of the September, 1990, issue of *EMTP News* for his 4-page paper entitled "Apple Macintosh versions of ATP." The following paragraph has been copied from the Summary of this paper:

Apple Macintosh II personal computers have been proven to be ATP-compatible. The standard Macintosh operating system Finder or Multifinder, not A/UX (Apple's Unix), has been used for this work. Because no memory management at all is available for Macintosh FORTRAN programs, the demands of EMTP on RAM are greater than for Intel-based microcomputers. Yet, 4 Mbytes of RAM allow EMTP simulation with tables sized at 3 times default dimensioning if one compiler (LSF) is used. A second, newer, 32-bit compiler (Absoft) promises faster simulation, but there have been problems with its use. Details follow.

S&C Electric Uses Intergraph ATP

Intergraph (Clipper) workstations have been used to support ATP by Arthur Jahnke of S&C Electric in Chicago. This follows the initial exposure at BPA early in the year. Whereas BPA testing indicated some problems, Mr. Jahnke seems to have avoided such troubles somehow --- perhaps by using a new FORTRAN compiler. As far as ATP developers in Portland can see by inspecting S&C's Intergraph EMTP solutions to BENCHMARK DC-XX test cases, all is well. Typical of other Unix computers, screen graphics remain to be implemented, however. Look for a more detailed report in the December issue of *EMTP News*.

Mass Driver Analysis Using EMTP

Wendell Neugebauer, an ATP user in Ballston Spa, New York, is the author of a 9-page paper in the September, 1990, issue of *EMTP News*. Entitled "Mass driver analysis using EMTP," this paper contains 3 introductory paragraphs that follow verbatim. A derivation of applicable equations is missing, unfortunately, but has been promised by the author for a future issue (December, if there is time) of *EMTP News*. Author Neugebauer's **Introduction** section, minus figures, follows in the next 3 paragraphs:

A mass driver is an electromagnetic device which can propel macroscopic particles to high velocities by making use of forces generated by electric currents and magnetic fields. Such devices may find use in the future as means for efficiently launching large payloads from the earth's surface directly into orbit. Perhaps an even earlier application would be Moon based because of lesser energy requirements and the virtual absence of atmospheric friction. As point of reference, the escape velocity of an object on the earth's surface is approximately 20 km/sec.

A simple form of mass driver is the rail accelerator shown in Fig. 1a at the right where a projectile with a conducting brush is accelerated between two rails by means of the forces created by the current flowing in the rails and in the conducting brush. In this example, the rail current is produced from the discharge of a bank of previously-charged capacitors (Fig. 1b below shows such a sample power supply). The accelerator itself is of the augmented type where the augmenting rails produce an additional magnetic field which helps to propel the projectile away from the source of the current.

Many different power supplies can be used to energize a mass driver. The capacitor bank of Fig. 1b was just one example. Another alternative could be based on a storage inductor energized by a homopolar (dc) generator, which could be discharged into the rails by means of a very complicated opening switch. Heretofore, the analysis of such power supplies and associated mass drivers has depended on custom computer programs written for each type of drive circuit. The use of EMTP can eliminate the need for custom programs and will allow rapid analysis of the effects of changes in the power supply circuit. The only new task is to represent the electromechanical action

of the mass driver by means of TACS or the newer MODELS feature of the EMTP .

Editors' note: Certain persons associated with the space program in Florida have interest in the technology described by author Neugebauer. They were mailed a copy of the paper around the end of September, and then contacted by telephone during the final week of November. It is hoped that some reaction, review, or response from Florida can be published in *EMTP News* before too long. Delays are inevitable, however, because of security considerations (the technology has potential military applications).

Florida Short Course March 11-15

Again next year, Prof. Dennis Carroll of the University of Florida in Gainesville will be offering his 4.5-day EMTP short course during the week of vacation that separates winter and spring quarters. This will be March 11 - 15, 1991.

A unique attraction of the Florida EMTP short course is the availability to each student of one 80386-based computer running the Salford EMTP. Another unique attraction is Disney World in nearby Orlando. Any potential registrant who has not seen Mouse World (Bruce Williams talk) is strongly advised to check with his travel agent about such a stop for the weekend before or after the short course in Gainesville. Because of the economy of excursion fares (including a layover Saturday night), it might cost no more.

Visiting faculty for the 1991 offering already have been selected. Dr. Kurt Fehrle of CANA and St. Joseph's College in Philadelphia will cover TACS, MODELS, and hvdc and static var simulation. Mr. Robert Hasibar of BPA will lecture on switching surge studies of transmission networks, including STATISTICS and SYSTEMATIC studies. Mr. Thomas Grebe of Elektrotek Concepts in Knoxville, Tennessee, will repeat his highly-regarded lecture of the two previous years on capacitor switching and surge protection. Finally, Dr. Meyer again will represent the user group and ATP developers.

Last year, registration had to be closed some 5 or 6 weeks prior to the course because the limited space had been filled. Those with serious interest are advised not to delay this year, either. There is even a discount for early registration. Questions can be answered by Prof. Carroll who has office phone number (904) 392-0918. If unavailable to talk in person, either an answering machine or a secretary should allow the caller to leave his name and number in order to be called back by Prof. Carroll.

Salford TPPLOT Scrolls Graphics, Supports Epson Printers, .PCX Files

Dr. Meyer describes the new Salford version of interactive plotting program TPPLOT in the September, 1990, issue of *EMTP News*. The following paragraph is the **Summary** section of this article which covers pages 42-50.

The interactive plotting program TPPLOT offers many advantages to users of the Salford DOS extender (DBOS / 386) on an Intel 80386-based microcomputer. Even prior to exploitation of the new FORTRAN compiler (FTN77 / 386 Rev. 2.40) by ATP developers in Portland, TPPLOT ran very well as documented in Section I. But the new compiler has made possible several important extensions over the past 3 months. Today, Salford TPPLOT offers features that for years have eluded users of more expensive workstations and minicomputers. Advantages of the new Salford TPPLOT include special-purpose windowing (Section II), the restoration (scrolling back) of previous plots (Section III), the saving of plots on disk as . PCX files of PC Paintbrush (Section IV), and finally, the creation of graphs on paper using Epson-compatible dot-matrix printers (Section V). The paper concludes with general, miscellaneous observations (Section VI).

Since this 9-page report, a lot of work has been done to provide a scrollable window for all dialogue of Salford TPPLOT. This latest improvement was completed over the Thanksgiving Day weekend, and it now works very well. Look for a detailed report in the December issue of *EMTP News*. Concerning use by others, beginning November 25-th, two versions of TPPLOT will be found on the Salford GIVE2 disk. File TPPLOT.ZIP will be for the program as described in September *EMTP News* whereas TPPLTNEW.ZIP will be for the latest version that includes a scrollable dialogue window. The old version will not be discarded until enough users report satisfaction with the new.

PC Paintbrush has been used successfully to edit or enhance .PCX files that were produced by Salford TPPLOT. The idea was mentioned on page 50 of the September issue of *EMTP News* (see reference [6]). Look for a report by Stuart McKay of Toronto, Ontario, in the March, 1991, issue of *EMTP News*.

LEC Corrects Synchronous U. M.

Mr. Yin Yuexin is a Chinese from Nanjing, The Peoples' Republic of China, who presently is working full-time for LEC in Leuven, Belgium. His study of the synchronous mode of the U.M. (Universal Machine) has led to a correction of the associated computer code. This

is described in the September, 1990, issue of *EMTP News* in the paper entitled "The improvement to the present synchronous machine code in UM modeling of ATP" (see pages 3 - 22).

Some skepticism must be voiced about the magnitude of the reported correction, however. Existing standard test cases BENCHMARK DCNEW-2 and DCNEW-9 were only affected in a very minor way by the modification. Character graphs appeared almost identical. For example, consider limits of the axis of PRINTER PLOTs for DCNEW-2. For shaft torque TQGEN, the minimum of -0.913 is unchanged whereas the maximum was increased from 1.466 to 1.467. Limits of the speed OMEGM are unchanged. Finally, for the armature current IPA, the maximum of 0.718 is unchanged whereas the minimum was decreased from -1.335 to -1.334.

Complete 33-MHz 80386 for $2864

33-MHz 80386-based computers are cheaper and more attractive than ever before for support of the Salford EMTP. Look for time trials in the December issue of *EMTP News*. About price, a local (Portland-area) computer shop offered the following package for $2309 each in quantity of 5 or more on November 7th: 100-Mbyte hard disk with 19-msec random access time, 64 Kbytes of RAM cache, 4 Mbytes of 70-nsec RAM, 2 floppy disk drives (both 5.25-inch and 3.5-inch), Paradise output card and Magic color monitor providing maximum resolution of 1024 x 768 pixels, 101-key keyboard, mouse, 4 ports (2 serial, 1 parallel, and 1 game), tower case with 250-watt power supply. Add $555 for an Intel 33-MHz 80387 math coprocessor, bringing the total to $2864. Other upgrade options included a 200 Mbyte disk (add $375), more RAM (add $70/Mbyte up to a maximum of 16 Mbytes on the motherboard). Five BPA engineers having interest in EMTP were impressed by not only the price but also the quality of this equipment, which they purchased from FEI America / Sonic in a suburb of Portland. Should readers have interest, they could telephone Ms. Mae Wu using the voice line (503) 620 - 8640 or the FAX line (503) 620 - 8520. The mailing address is:

15844 S.W. Upper Boones Ferry Road
Lake Oswego, Oregon 97035; USA

Dr. Kurt Fehrle of CANA in Philadelphia is a recent convert from the MS-DOS version of EMTP to the Salford version. CANA (CGEE Alsthom of North America) is the former hvdc operation of General Electric, which was sold to CGEE Alsthom of France. Clearly, these are people with real (as opposed to academic or artificial) data cases that use TACS. Dr. Fehrle has reported a 3-to-1 speedup while moving a meaningful simulation of static var control from MS-DOS to Salford on a 33-MHz 80386-based computer. Look for details in the December issue of *EMTP News*.

Mustafa Kizilcay's PCPLOT Program

PCPLOT version 6.03 was carried back to Portland from Europe, and now is being distributed along with Salford EMTP materials. This replaces version 6.02 that has been used in recent months. The new version was given to Dr. Meyer by Mustafa Kizilcay himself the day before the annual LEC meeting in Leuven, which began October 15th. The new version of PCPLOT was archived in Portland and put on the 2nd Salford disk (GIVE2) using the name PCPLT603.ZIP. If and when a new MS-DOS version is repackaged for distribution to others, the new PCPLOT should replace the old here, too.

HP-GL output of PCPLOT sometimes results in a graph that has its top clipped just a little. This was the finding of Mike Lissick of Northern States Power Company (NSP) in Minneapolis. BPA once observed the same phenomenon using its DEC LVP16 pen plotter (presumably built for DEC by H-P). It is difficult to understand how or why the H-P plotter in Hannover must somehow have slightly different coordinates. In any case, the adaptability of Mustafa Kizilcay's PCPLOT saved the day. Mr. Lissick reported that he was able to produce a perfect (complete) plot by changing variable **y-limit** of PCPLOT.INI from the original 7721 to 9380.5 (the average of the original value and 11040 which earlier had been found to produce a complete top but to clip the bottom!).

Westinghouse Uses SunOS 4.1

Valuable hints about the support of EMTP using the new Sun Unix operating system, SunOS 4.1, have been provided by Richard Carlson of Westinghouse Marine Division in Sunnyvale, California. In order to continue using Sun's free graphics named CGI (Core), a few changes must be made. If not, linking will fail to connect with the desired graphics libraries as requested by the references -lcgi77 and -lcgi. According to Mr. Carlson, one first should execute the script /usr/old/install_from_old which will place a copy of needed Core graphics in /usr/lib. Second and finally, execute ranlib -t *.a within directory /usr/lib to update the symbol table. Without this, the linker will find the graphics of the first step, but will complain that they are out of date. It should be mentioned that BPA probably never will update the operating systems of its 4 EMTP-dedicated Sun-3/140 workstations beyond the present SunOS 4.0.3 due to a lack of disk space. So, there is no way for ATP developers in Portland to utilize this valuable information. In case any other Sun EMTP user has related observations, he could exchange information with Mr. Carlson by telephoning (408) 735 - 2852.

Slow MODELS vs. Fast TACS

Laurent Dube's new control system modeling, MODELS, executes more slowly than TACS. But how great is the loss of speed? For reasons that are not yet understood, the penalty is substantially greater using BPA's fastest VAX, an 8650, than it is using an Intel 80386-based personal computer or a Motorola 68020-based workstation. This is demonstrated by the following table:

Standard BENCHMARK Case	DC-30A	DC-30C
DEC 8650; VAX / VMS	4.94	15.48
16-MHz Intel 80386; Salford	16.98	32.53
16-MHz Motorola 68020; Sun	20.62	44.04

where results of Salford EMTP execution were used for the Intel 80386 row. The first subcase of BENCHMARK DC-30 has existed for 14 or 15 years; it models the restrike of a circuit breaker using TACS. The 3rd subcase is the same simulation except that MODELS has replaced TACS. The VAX 8650 results (the average of 2 trials) were obtained first, and were the cause of some concern. The ratio of 3.13 is larger than anyone (including author Laurent Dube!) expected. Well, as can be seen, other computers do not demonstrate as much difference. The speed ratios for Intel and Motorola are 1.92 and 2.17, respectively.

EMTP News Now Local and Cheap

EMTP News is the international journal of EMTP usage and development. Published quarterly by LEC, this valuable reference has averaged some 50 or 60 pages per issue over the past two years. For some six months, now, it has been available much more cheaply and conveniently to licensed ATP users of the United States and Canada thanks to secondary printing and mailing by the Can/Am user group. This was announced in the April issue of *Can/Am EMTP News*. The key detail was the requirement of a $15 check payable to Tsu-huei Liu each calendar year for the 4 associated issues (March, June, September, and December issues, typically).

Real Time Control Using EMTP ?

Ms. Concetta Pragliola of Ansaldo Transporti in Naples, Italy, expressed the desire last spring to connect her company's hardware with their VAX/VMS version of EMTP. Apparently Ansaldo manufactures or otherwise works with the real electronic hardware that will generate control signals for thyristors that are involved with variable-speed drives. The EMTP would be used to represent everything except the control hardware (e.g., a bridge circuit and an induction motor for traction applications). Both EMTP and real hardware would have to operate in locked step, of course, to produce such a hybrid simulation. There should be a paper about this (yes, such simulation should be possible!) in the March, 1991, issue of *EMTP News*. Meanwhile, an exciting possible use might be to simulate electronic relaying. Rather than speeding up signals from the EMTP, could one slow down the relay enough to run it in locked step with EMTP? Several knowledgeable persons have yet to say "no." The first ones consulted were Bob Ryan of Doble Engineering, Bruce Mork of NTH in Trondheim, Norway, Timothy Tibbles of Schweitzer Engineering, and Bob Wilson of the University of Idaho. Call Portland if interested.

TPPLOT HPGL --> Microsoft Word

Mr. Fred Elliott of BPA first tried to send an HP-GL file produced by TPPLOT into his MS-DOS version of Microsoft Word. It did not work, he found, because Microsoft Word rejected the first line, which had been created for VAX/VMS use at BPA. After removing the extraneous line, the graph looked fine. To solve the problem for all computers, the model of Mustafa Kizilcay's PCPLOT was followed. Output now begins with as many as 8 lines of user-supplied HP-GL initialization that come from a new disk file named TPPLOT.INI (more about this is being written for the December issue of *EMTP News*).

Standard BENCHMARK Case	DC-30A	DC-30C
DEC 8650; VAX / VMS	4.94	15.48
16-MHz Intel 80386; Salford	16.98	32.53
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